

### 3.0 NEPA REVIEW PROCESS

#### 3.1 SUMMARY OF 1987, 1997, AND 2002 EAs

As mentioned in Section 1.1 of this document, DOE prepared an EA<sup>2</sup> prior to the construction and operation of CEBAF. The EA evaluated and compared the impacts of the construction and operation of a facility to utilize CEBAF technology as opposed to an alternative technology (i.e., pulsed linac with pulse stretcher ring), and considered alternatives to the proposed site at Newport News, Virginia (i.e., Charlottesville or Blacksburg, Virginia). In the 1997 EA, a proposed change in operating parameters of CEBAF and the operation of the FEL were reviewed.

In the 1987 EA, impacts were evaluated for the proposed operation of an electron beam in the range of 0.5 to 4.0 GeV beam energy with a maximum beam power of 1000 kW. In the 1997 EA, impacts were evaluated for operation up to 8.0 GeV while maintaining the 1000 kW beam power limit. The EA also evaluated the operation of the FEL for producing a laser beam up to 20 kW IR and 10 kW UV<sup>3</sup>. In the 2002 EA (DOE/EA-1384), impacts were evaluated for the construction of various site improvements and the proposed installation and operation of the Helios accelerator in the proposed FEL addition. At present, the Helios Accelerator has not been made operational and is not in the Laboratory's 2005 Ten-Year Site Plan, though plans to continue with the FEL addition are still underway.

DOE issued FONSI for the 1987, 1997 and 2002 EAs. The 1987 EA identified short-term impacts to air quality, groundwater, soils, and ambient noise anticipated from construction activities. No major environmental impacts, or adverse effects on worker and public health, were predicted for either CEBAF construction or operation. Construction of CEBAF was completed in early 1995, and regular operations commenced shortly thereafter. The 1997 EA analyzed releases of radionuclides to the environment that could have adverse effects on worker and public health and any ecosystem, and it was determined that no substantial impacts would be expected from the operation of CEBAF or the FEL at the operating parameters noted above, and as construction would be minimal, there were no anticipated short-term impacts to air quality, groundwater, soils, and ambient noise. The 2002 EA identified short-term impacts to air quality, groundwater, soils, and ambient noise anticipated from construction activities. No major impacts or adverse effects on workers and public health and the environment were predicted from either the construction of new buildings or the installation and operation of the Helios accelerator at the FEL.

#### 3.2 OTHER ENVIRONMENTAL REVIEWS

Since the 1987 EA and FONSI were issued, some modifications and alterations have been made to facilities and land areas at the Jefferson Lab site. These changes have included the construction of support buildings and other improvements to maintain CEBAF and FEL

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<sup>2</sup> DOE 1987. An Environmental Assessment for the Continuous Electron Beam Accelerator Facility, Newport News, Virginia (DOE/EA-0257), January.

<sup>3</sup> DOE 1997. Environmental Assessment "Change in Operating Parameters of the Continuous Electron Beam Accelerator Facility and Free Electron Laser", Thomas Jefferson National Accelerator Facility, Newport News, Virginia (DOE/EA-1204), October.

operations. Before these changes were implemented, they were examined relative to activities covered in the 1987 EA to determine whether further environmental reviews were necessary. All actions were either categorically excluded using criteria in Subpart D of 10 CFR 1021, DOE NEPA Implementing Procedures, or determined to be part of the original scope of actions covered in the 1987 EA<sup>4,5,6</sup>. A new EA was prepared in 1997, as further discussed below, for the proposed increase in the maximum CEBAF beam energy up to 8.0 GeV and the operation of the FEL as described in Section 3.1.

The 1997 EA reported the results of an assessment of the potential for increased radiological releases due to increasing the CEBAF beam energy for the purposes of accelerator testing and operation, from energies up to 4.0 GeV with a maximum beam power of 1000 kW, to energies of 4.0 to 8.0 GeV with a beam power not to exceed 1000 kW as averaged over a one-week time period. This small variation in operating power level enables CEBAF operations staff to perform occasional small adjustments in beam current levels without exceeding established administrative and operational limits.

The three primary sources of potential impact identified and examined in the 1997 EA were: radiological impacts on occupational health, radiological impacts on public health, and induced radioactivity in groundwater. On examination in the 1997 EA, as the CEBAF beam power would not increase beyond the present level set for 4.0 GeV operations, no increase in radiological doses to workers was expected. In evaluating offsite radiological exposure, it was determined that skyshine radiation exposure, the chief source to members of the public, would not increase, but would likely decrease with the rise in beam energy to 8.0 GeV. Therefore, no increase in exposure to the public, even taking into account the small amount of additional airborne radiation that would be generated, would be expected. For the same reason, no effective increase in beam power, the activation of groundwater near the accelerator was expected to remain minimal but constant<sup>7</sup>. Therefore, the groundwater activity levels should remain well below the 5 pCi/ml (picocuries/milliliter) limit of the VPDES Permit that primarily addresses CEBAF operation<sup>8</sup>. Thus, it was determined that the action described in the 1997 EA and FONSI did not have the potential for causing impacts beyond those documented in the 1987 EA and FONSI.

The 2002 EA evaluated the potential environmental impacts from proposed construction of various site improvements and the proposed installation and operation of the Helios light source. The impact analysis in this EA focused on (1) the primary impacts due to some fairly large-scale

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<sup>4</sup> SURA 1990. National Environmental Policy Act Documentation Review, Continuous Electron Beam Accelerator Facility, Newport News, Virginia, January 12.

<sup>5</sup> SURA 1993. National Environmental Policy Act Documentation Review, November 1989 to September 1993, Continuous Electron Beam Accelerator Facility, Newport News, Virginia, September 30.

<sup>6</sup> SURA 1996. National Environmental Policy Act Documentation Review, Continuous Electron Beam Accelerator Facility, Newport News, Virginia, August 26.

<sup>7</sup> Stapleton, G. et al. 1997. "Occupational and Environment Aspects of the Radiation Control Provisions at Jefferson Lab," Jefferson Lab Tech Note, JLAB TN 97-017, Newport News, Virginia.

<sup>8</sup> VPDES 2001. Virginia Department of Environmental Quality VPDES Permit No. VA0089320. U.S. Department of Energy, Thomas Jefferson National Accelerator Facility, Newport News, Virginia. Effective July 16, 2001 to July 16, 2006.

construction actions on surface water, air quality and noise; (2) the ultimate changes in site land use due to these actions including effects on terrestrial resources and storm water control and effects from building operations; and (3) the installation and operation of Helios and the assessment of the potential radiological impacts to the public and workers and the potential for activation in the surrounding environment. On examination, further development of the DOE site identified minimal to moderate impacts to surface water if current storm water flows were not mitigated. The construction hazards evaluated were found to be typical for this type of activity.

In addition, the commitments reported in these EAs and their FONSI were reviewed in the course of writing this EA to determine whether they had been addressed appropriately. All of the commitments identified in the three EAs were either performed in the course of ongoing activities, such as installing temporary shielding to limit radiation dose to the general public or, as needed, when the requirement for a new permit was identified. In line with the commitments in these EAs, current procedures are updated and new procedures are instituted as identified by Jefferson Lab staff and by the DOE. With commitments and BMPs in mind, the DOE has frequently interacted with Federal, State, and local agencies and authorities to stay informed of regulatory and policy changes that could affect Lab activities that include the operation of CEBAF and the FEL.

### **3.3 SCOPE OF THIS EA**

This EA has been prepared pursuant to Section 102 of NEPA of 1969 (Public Law 91-190), as implemented by regulations promulgated by the President's CEQ (40 CFR, Parts 1500–1508, November 1978 and changes) and DOE NEPA Implementing Procedures (10 CFR Part 1021, April 1992 and changes). It is intended to:

- provide sufficient evidence and analysis for DOE to determine whether to prepare an Environmental Impact Statement (EIS) or a FONSI;
- assure that DOE complies with NEPA when an EIS is not necessary; and/or,
- facilitate preparation of an EIS, should one be deemed necessary.

Pursuant to Section 1508.9 of the CEQ regulations, this EA presents information and analyses of the proposed action and all reasonable alternatives. Section 2 describes the proposed construction actions and alternatives for each activity and notes some of the potential environmental impacts of each. Section 4 describes the existing environment and reports the environmental, safety and health impacts of the proposed action. The discussion of impacts includes a description of any adverse effects that cannot be avoided should the proposal be implemented, irreversible impacts, if any, and any mitigation measures needed to minimize adverse impacts.

The proposed action involves the projected upgrade and operation of the CEBAF and FEL accelerators and associated utility system expansions. Also included in this proposed action are the construction and use of other buildings and storm drainage and traffic improvements.<sup>1</sup> See Figure 2 for a site map showing the proposed locations for each of these projects. The improvements addressed in this EA will assist the Laboratory in making full use of this national physics resource by extending research capabilities with the upgrade of the accelerators and by better accommodating existing researchers, Lab technical and support staff, and expected additional research personnel.

Due to the variety of projects which affect the environment differently, the provided impact analysis is balanced around (1) the temporary impacts due to some fairly large-scale construction actions on surface water, air quality, and noise concerns; (2) the development, fabrication, and operation activities related to CEBAF and its associated Hall D complex actions, changed operation at existing Halls A, B, and C and the potential for radiological impacts to the public and workers and the potential for activation in the surrounding (on and off site) environment during operations; and, (3) the ultimate changes in site land and resource use due to these actions, including effects on terrestrial resources, storm water management, and from building operations. There is little potential for adverse impacts from any of the following focus areas: long-term non-radiological air quality; geology and soils; floodplains; wetlands; or community resources including cultural and socioeconomic effects.